Vocabulary:

Point   =   a single dot in space. No width, length, or height.

Line   =   formed by two points in space. Has length only.

Plane   =   formed by two intersecting lines. Has width and length.

Solid   =   formed by two intersecting planes. Has **width, length, and**
height.

Poly   =   many

Gon   =   angle

Hedron   =   faces

Poly + gon =   means many angles. A 2-dimensional figure that enclose a space.

Poly + hedron   = means many faces.   A set of polygons enclosing a 3—D space.

Notes:
   • Polygons form the faces of polyhedrons.

   • Polygons have three parts. A vertex, an edge, and a face.

   • Polyhedrons have the same three parts but within 3
     dimensions.

   • A geodome is a type of polyhedron.

Vertex   =   the points of a polyhedron or solid. E.g. tip of a pyramid.

Edge   =   the lines of polyhedrons or solids. Where planes or faces meet.

Face   =   the planes or flat surfaces of a polyhedron.

One-dimensional   =   theoretically containing only the dimension of width.

Two-dimensional   =   containing only length and width. E.g., polygons.

Three-dimensional   =   containing length, width, and height. E.g., polyhedra.

Sphere   =   a 3-dimensional shape comprised of infinite points all equi-distant
                     from a singular and central point

Diameter   =   the distance between 2 points on a circle or a sphere as measured
                     by a line that passes through the center

Area   =   a measure of 2 dimensional surface obtained by multiplying the two
                     dimensions of length and width together

volume   =   a measure of 3 dimensionality obtained by multiplying the three
                     dimensions (length x width x height) together

Geo   =   earth

Dome   =   house   Geodome = earth house

Students can be introduced to the names and characteristics of specific
polygonal and polyhedral shapes

Polygonal shapes   Polyhedral shapes

Trigon	3	
Quadragon	4	tetrahedron
Pentagon	5	
Hexagon	6	hexahedron
Septagon	7	
Octagon	8	octohedron
Nonagon	9	
Decagon	10	
Dodecagon	12	dodecahedron
Icosagon	20	icosahedron

● Discuss prefixes and suffixes

poly	=	many
gon	=	angles (<u>not</u> sides!)
hedron	=	face (face of a building)

• point out the examples of the inconsistencies of naming:

    tri + angle (greek+English)
    quadra + gon (roman +greek)
    tetra + hedron (greek + greek)

• explain shapes have taxonomies (names), categories (families they belong to), and have specific names for their different parts (edge, angle, radius, diameter, etc).

Some facts that are nice to know

- single points are the beginning basis of geometry and shapes

- two points create a line

- Two intersecting lines create a plane; as in the 2 converging edges of a piece of paper.

- Two intersecting planes make a _____? (line) Look at two convergent classroom walls.

- Three intersecting planes make a _____? (point) Look at the corner where the ceiling and two walls meet.

- A circle's area quadruples when its diameter is doubled.
  (What does this mean if you are buying or selling pizzas and a
  10" pizza costs 10.00 and a 20" pizza costs 20.00?)

- The volume of a sphere octuples when its diameter doubles.

- A sphere and a circle are not geometric shapes.

- Triangles ARE the strongest shape. Why? They are formed by connecting three first class levers all stuck in the strongest, but least mobile, position.

- The bigger a geodome becomes, the stronger and lighter it becomes.

- Conduct an internet search using the following words:
      geodome
      Buckminster Fuller

Tensegrity
Kenneth Snellen
Platonic solids
Archimedean solids
Origami + Geometric shapes

● Buckmnster Fuller drew numerous metaphorical connections between dome geometry and the human condition.

● Space has weight and its shape can influence behavior.

● When the diameter of a sphere is doubled, the surface area quadruples, and the volume octuples!! What does this mean for a person buying a hot air balloon? Consider lifting power, fuel costs, and value.

Follow-up Activities

● create polygonal and polyhedral models using 2-holed coffee stirrers and 2" lengths of pipe, cleaners. Download instructions from mallorybagwell.com

● use origami polyhedra to initiate a study of solid geometry.

● discuss how the flow of force throughout a geodome is similar to the internet or human thought processes (such as dreaming)

● Metaphorically speaking, how are geodomes like:

        calculators?
        the internet?
        rules of social order?
        kites?
        the human nervous system?
        houses?

● Do domes embody the above discussion results more in the metaphorical sense or in the literal sense, or both?